

Two Eagle Vegetation Management Project Invasive Species Report

Wallowa-Whitman National Forest
La Grande Ranger District

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Invasive Species

Introduction

This report addresses the existing conditions and the potential effects of the Two Eagle Vegetation Management Project (Two Eagle) as it pertains to non-native (invasive) species. Invasive species are defined as a non-native species whose introduction causes or is likely to cause economic, environmental, or human health harm. An invasive species is distinguished from other non-natives by their ability to spread in native ecosystems. “Noxious weeds” on the other hand, is a legal term used by state, county, and federal agencies to denote plants that pose particular threats, generally to agriculture. Many undesirable non-natives can be invasive and pose threats to healthy native ecosystems but do not meet the criteria for listing as a “noxious weed.” For that reason, this analysis will focus on all invasive non-native species and not just those listed as “noxious weeds.”

Analysis Framework: Statute, Regulatory Environment, Forest Plan and Other Direction

Regulatory Environment

Forest Plan

The Pacific Northwest Region Invasive Plant Program Record of Decision (ROD) (USDA 2005) amended the Forest Plan (amendment #RF-5) for the Wallowa-Whitman National Forest in 2005. The Region 6 ROD outlined 23 standards for the prevention and management of invasive non-native plants that have been added to all regional forest plans and require consideration of invasive species in all planning efforts. The regional ROD does not however, approve any site-specific treatment, instead requires a completed analysis by each National Forest (see the specific sections below for the specific analysis).

Of the 23 prevention and management standards in the regional ROD, only seven directly affect activities found in Two Eagle. These standards are:

1. Prevention of invasive plant introduction, establishment and spread will be addressed in watershed analysis; roads analysis.....vegetation management plans, and other land management assessments.
2. Actions conducted or authorized by written permit by the Forest Service that will operate outside the limits of the road prism, require the cleaning of all equipment (bulldozers, skidders, graders, backhoes, dump trucks, etc.) prior to entering National Forest System Lands.

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3. Use weed-free straw and mulch for all projects, conducted or authorized by the Forest Service, on National Forest System Lands.
7. Use only gravel, fill, sand, and rock that are judged to be weed free by District or Forest weed specialists.
8. Conduct road blading, brushing and ditch cleaning in areas with high concentrations of invasive plants in consultation with District or Forest-level invasive plant specialists.
12. Develop a long-term site strategy for restoring/re-vegetating invasive plant sites prior to treatment (if invasive plant treatment is needed prior to project activities as a prevention measure).
13. Native plant materials are the first choice in re-vegetation for restoration and rehabilitation where timely natural regeneration of native plant community is not likely to occur.

Under the Region 6 ROD, these standards apply to the prevention and management of all invasive non-native species and not just those listed as “noxious weeds”.

Wallowa-Whitman National Forest Invasive Species Plan

In 2010 the Wallowa-Whitman National Forest Invasive Species Plan ROD was signed. This decision authorized the treatment of invasive non-native species on specific sites on the forest. This decision created the ability to conduct Early Detection Rapid Response (EDRR) on newly discovered sites. The ability to respond to new spread or establishment of invasive non-native species has given the Forest Service a tool that should help reduce the spread and establishment of invasive species by about one-half of the previous rate.

La Grande Ranger District Invasive Species Mitigation and Monitoring Recommendations

The following specific measures are recommended to be implemented along with any action undertaken in the Two Eagle Project in order to mitigate the effects of project activities.

- 1- Project personnel would inform invasive species personnel pre-seasonally annually of upcoming project activities (i.e. ground disturbing activities), so reprioritization of treatment (if deemed necessary) and inventory can begin prior to the start of project activities.
- 2- New infestations would be inventoried and managed under early detection rapid response (EDRR) guidelines.
- 3- To reduce the potential spread from known invasive plant sites, these occurrences would be identified as Areas-To-Avoid for moderate to high-risk ground disturbance activities. Coordination will occur with invasive species specialists for exceptions.
- 4- All landings and skid trails with soil disturbance evident would be rehabilitated and seeded with an approved native seed mix after completion of project activities on those sites.

The monitoring of the mitigation measure implementation is described in the following chart.

Type	Activity Monitored	Frequency and Timing	Responsible Person
Implementation	Noxious weed inspections, equipment cleaning, weed infestation avoidance, documentation and communication.	Prior to move onto NFS land and during active operations near noxious weed infestations.	Contract Administrator
Effectiveness	Noxious weed survey and inventory	Annually for 3 years following project end.	Zone Invasive Plant Coordinator
Implementation	Broadcast seeding of disturbed soils.	Within the seeding period following the	Contract Administrator

Type	Activity Monitored	Frequency and Timing	Responsible Person
		disturbance.	
Implementation	Road rock sources, pits and/or quarry noxious weed inspections	Prior to use for road construction, reconstruction, or maintenance	Zone Invasive Plant Coordinator; Zone Engineer
Implementation	Noxious weed avoidance while prescribed burning	Included in burn plans prior to approval	Burn Plan Coordinator

Existing Condition

Invasive Plant Species Presence within the Project area

There are 30 inventoried invasive non-native plant sites (8 different species) within the Two Eagle Project Area. The inventoried acres within the project area are shown in the table below (Table 1). Acreages reflect current information in the Forest INSP GIS layer (GID query, April 8, 2018). In addition to these listed species the project area also includes *Ventenata dubia*, *Bromus tectorum*, and others that are potentially harmful invasive species but do not meet the requirement for listing on the state or county “noxious weed” lists. One week of surveying was done in September 2017. Most of the open and closed roads in the project area along with the dispersed camping sites were surveyed. Some cross country forays were made where it seemed intuitively relevant. One small whitetop site was discovered and a few historic sites were expanded along roads to more accurately record the extents of the infestations. Many sites are linear, lying along roads, and in several cases multiple species occur within a single location. Treatment and monitoring records document all site visits by invasive plant specialists, spanning the years since initial discovery and inventory of the site. These records are on file at the La Grande Ranger District Office in La Grande, Oregon. These sites are visited on a regular basis for treatment and monitoring and can be relocated and identified on the ground when necessary.

Table 1. Invasive plant inventory and Oregon Designations

Scientific Name	Common Name	Gross Acres	Union County Designation	Oregon State Designation
<i>Cardaria draba</i>	whitetop	72.6	B	B
<i>Centaurea diffusa</i>	diffuse knapweed	73.9	B	B
<i>Centaurea maculosa</i>	Spotted knapweed	0.1	B	B (T)
<i>Cirsium arvense</i>	Canada thistle	266.7	B	B
<i>Cynoglossum officinale</i>	gypsyflower	340.5	B	B
<i>Hypericum perforatum</i>	common St. Johnswort	2.3	B	B
<i>Onopordum acanthium</i>	Scotch cottonthistle	11	B	B
<i>Potentilla recta</i>	sulphur cinquefoil	0.1	B	B
Total		767.3		

Union County and the Oregon Department of Agriculture (ODA) designate listed invasive species status using a similar system.

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“A” designated species – an invasive of known economic importance which occurs in the state in small enough infestations to make eradication or containment possible; or is not known to occur, but its presence in neighboring states makes future occurrence in Oregon seem imminent.

Recommended Action: Infestations are subject to intensive control when and where found by Baker County with possible assistance from the Oregon Department of Agriculture.

“B” designated species – an invasive of economic importance which is regionally abundant, but which may have limited distribution in some counties.

Recommended Action: Moderate to intensive control at the county level.

ODA also has “T” designated species, which are a priority noxious weed designated by the Oregon State Weed Board for which the ODA will develop and implement a statewide management plan. “T” designated noxious weeds are species selected from either the state “A” or “B” lists.

Effects

Effects Analysis Methodology

The effects (expected and potential) were assessed using field surveys, literature documentation, documented site information, and professional judgment. The boundary of the direct, indirect and cumulative effects analysis is the project area boundary. This area encompasses all areas of potential project activities.

Assumptions

The following are assumptions were utilized for analyzing the effects of implementing the alternatives in the Two Eagle Project.

- Invasive non-native species populations are increasing at a rate of 8-12% per year on public lands (USDA 2005).
- The record of decision for the Wallowa-Whitman National Forest Invasive Species Management EIS and the adoption of the standards from the Region 6 ROD should slow the annual rate of spread and establishment of invasive non-native species by up to 50% annually (down to 4-6%) (USDA 2005, USDA 2010).
- Mitigations described earlier are implemented in full.
- Timeframes – the following timeframes were used to discuss the direct, indirect and cumulative effects of project implementation on invasive species related to the potential for establishment and spread of invasives:

A. Potential for Establishment

- **Short-term timeframe:** 1-3 years. This period of time would be long enough to notice the germination and growth of any new invasive non-native species after project activities.
- **Long-term timeframe:** 25-30 years. This long term timeframe was chosen because climate change, unforeseeable future projects, demographic changes, etc., make assumptions beyond this timeframe speculative. Further, changes in the plant community

dynamics would have been identified by this point and establishment of invasive non-native plants due to project activities would have occurred

B. Potential for Spread

- **Short-term timeframe:** 1-3 years. This period of time would be long enough to notice the increase in size of a known infestation, and allow for the rapid response to potentially contain that site after project activities.
- **Long-term timeframe:** 25-30 years. This long term timeframe was chosen because climate change, unforeseeable future projects, demographic changes, etc., make assumptions beyond this timeframe speculative. Further, changes in the plant community dynamics would have been identified by this point and spread of invasive non-native plants would have been established.

Invasive non-native species are currently damaging the biological diversity and healthy native plant communities located both on and off national forest system (NFS) lands. The introduction and subsequent spread of invasive species can have a variety of environmental effects such as displacement of native species, reduction in suitable habitat, reduction in forage for livestock and wildlife, destruction of habitat and loss of threatened and endangered species (TES) species, increased soil erosion, water quality reduction, and significant reductions in soil productivity. The establishment and spread of non-native plants is a dynamic event that incorporates many diverse variables. Invasion theory, as it pertains to non-native species, contains three main principles: disturbance, propagule pressure, and competition (Hobbs & Huenneke 1992, Lockwood et al. 2005, Sutherland 2008).

Invasive species are quick to colonize an area of disturbance and can use their “weedy” life-history traits to establish within novel habitats. Disturbance such as fire, construction, mining operations, and commercial timber harvest can alter native plant communities and increase the chance of invasion by non-native species. Several factors such as type of disturbance, proximity to propagule source, and size or magnitude of disturbance can increase the propensity for invasion of an otherwise healthy plant community by non-natives. (Vitousek et al. 1996, Mack & D’Antonio 1998, Chapin et al. 2000, D’Antonio 2000).

The second factor in the invasion theory is propagule pressure. Propagule pressure is defined as the number of possible individuals (seeds, seedlings, etc.) released into a region in which they are not native and the number of such release events (Lockwood et al. 2005). In essence, the higher the propagule pressure (more seeds or more opportunities for a release) the greater the likelihood of a successful colonization. Many factors can lead to increased propagule pressure but the most likely cause is an increase in the number of release events. Many activities conducted on NFS lands can lead to an increase in the propagule pressure including fire, timber sales and salvage, road construction, use of heavy equipment, recreation, and grazing.

Finally, the last principle of invasion theory is competition. Even though the ability of an invasive to spread or colonize new sites is generally species dependent, all invasive non-natives are considered potential threats to native plant communities due to traits that make them good competitors for resources.

Methodology

Throughout this document, the potential for each of the proposed activities to increase the establishment and spread of invasive species is described using the following qualitative scale:

- NO – Project activities have no potential to introduce or spread invasive species.

- **LOW** – Activities identified as low would create little to no bare soils and have extremely limited potential for the introduction of invasive plant material to the project area. If left untreated, invasive species within these areas would not spread from current locations or expand from current levels at rates higher than those found in the absence of project activities.
- **MODERATE** – Moderate level activities are those that, with recommended mitigation could be treated and reduced to pre-project levels, but without the implementation of these measures could begin to spread beyond current levels.
- **HIGH** - A high level activity is one that is very likely to create opportunities for the spread and introduction of invasive species which could not be mitigated with prevention measures. To control a population of invasive species established under high intensity activities would likely require an increase in invasive treatment activities (including herbicide use) and funding in order to control the infestation.

In order to analyze the effects of project activities on the potential establishment or spread of invasive non-native species, a qualitative estimate for the potential of the impact has been established for each action. They are based on the amount of ground disturbance proposed, the likelihood of spread of an existing site or new sites being established and the proximity of current invasive non-native species sites. An activity with little new ground disturbance and no known invasive non-native plants in the vicinity would be rated as having a low potential for invasive species establishment while an area that proposes large scale ground disturbance with invasive non-native plants nearby might be rated as a high. Likewise, if an activity would create little to no ground disturbance and there are no known invasive non-native species infestations nearby it would be rated as a “No” potential for spread while activities that propose large scale new ground disturbance with invasive non-native plants on site might be rated as having a high potential for spread.

Measurement Indicators

The following two indicators and qualitative ratings will be used to analyze the effects of implementing the alternatives on invasive species. Differences between alternatives will be displayed by comparing the potential change in the indicators from the existing conditions.

A. Potential for Establishment of Invasive Species

While direct/indirect effects on the potential establishment of non-native plants are difficult to predict and quantify, they would occur through ground disturbance and introduction of invaders into new areas. Disturbance is defined as a punctuated event or series of events that kill or damage existing organisms, directly or in-directly increase resource availability, and create an opportunity for new individuals to become established (Sousa 1984). Disturbance associated with vegetation management activities are expected through movement of heavy equipment, soil displacement, and vegetation compression; but the amount of disturbance can vary depending on activity density and type. Project activities can introduce new species into areas by transporting non-native plant material on machinery or personnel. Increased disturbance and access would increase the potential for new establishment of invasive non-native species in sites previously unoccupied. Wildfire suppression would also have the potential to increase the risk of establishment of invasive non-native species, but predicting wildfire occurrence is problematic.

B. Potential for the Spread of Invasive Species

The potential spread of non-native plants is also difficult to predict and quantify; however, it would occur through ground disturbance and the possible increase in “invasibility” or reduction in competition from native species after disturbance. Increased disturbance and pre-existing invasive non-native sites in the vicinity of project activities would increase the potential for spread of invasive

non-native species. Wildfire and the activity involved in suppression would also increase the risk of spread of invasive non-native species, but predicting wildfire occurrence is problematic. Large scale and intense wildfire disturbance would create ideal areas for the introduction and spread of non-native plants. With increasing numbers of wildfires the numbers of non-native species could increase (Merriam, et al., 2006), with the largest increases found in those areas with pre-existing non-native plant populations. (Zouhar, et al. 2008)

Direct and Indirect Effects on Invasive Species

Four alternatives are being analyzed for this project: Alternative 1 (no action), and Alternatives 2, 2M, and 3 (action alternatives); to determine the magnitude of direct, indirect and cumulative effects on invasive non-native species. The action alternatives in the Two Eagle Project consist of vegetation treatments including commercial harvest, non-commercial thinning, and associated fuels treatments such as grapple pile, hand pile, and prescribed fire. The action alternatives also include temporary road construction, road reconstruction, road maintenance, and the removal or replacement of three culverts. A summary of all activities is found in alternative description section of the Two Eagle Environmental Assessment (EA). In the short term the activities of the action alternatives would cause soil disturbance and alter the canopy cover which would create opportunities for invasive plants to establish and spread.

Alternative 1 – No-Action Alternative

No project activities (including commercial thinning and prescribed burning) would be authorized under this alternative. All inventoried invasive sites would continue to be managed in accordance with the Wallowa-Whitman Invasive Plant Program EIS (USDA 2010) and the Wallowa-Whitman Forest Plan as amended by Regional Forester Amendment #5 that incorporates the Pacific Northwest Region Preventing and Managing Invasive Plants Record of Decision (USDA 2005).

Potential for Establishment

There would be no direct effects to the establishment potential of invasive non-native species because no activities would be authorized. Many vectors for the establishment of new populations would still exist from on-going recreation and vehicle travel, livestock and big game transport activities within the project area. Over time, with no additional disturbances to known sites, further treatment success, and no reduction to existing desirable vegetation cover and vigor the known sites could be eradicated or significantly reduced.

However, without fuel reduction activities within the project area, indirect effects from wildfire may increase. Wildfire suppression activities could increase the risk of establishment of new invasive species through transport of non-native species seeds and material from personnel and equipment. The potential for this impact would be rate as **Low** due to mitigations and requirements associated with fire suppression activities that reduce this risk and minimize the possibility of invasive species material transport into previously uninfested areas.

Potential for Spread

There would be no direct effects to the spread potential of invasive non-native species because no activity would be authorized; however, as described above, vectors which can spread seeds from known populations would still occur (recreation, vehicle travel, livestock, big game, etc.) within the project area. In the long-term, with no additional disturbances to known sites, further treatment success, and no reduction to existing desirable vegetation cover and vigor the known sites could be eradicated or significantly reduced.

As discussed under the potential for spread, without fuel reduction the risk of wildfire would continue to be an issue in the project area. Ground disturbance from wildfire and the associated suppression activities create ideal situations for the spread of current invasive species sites. The movement of personnel and equipment through existing non-native species sites could allow for an increased rate of spread. Therefore, the potential spread in the event of a wildfire would be **Moderate**.

Alternatives 2, 2M, and 3 - Action Alternatives

The following tables summarize the effects of implementing the actions proposed in each of the action alternatives and the potential intensity of those effects. Table 2 shows the effects of prescribed fire on invasive species associated with Two Eagle. This information would not be used to guide the burn plan since the timing for prescribed burning is mostly dictated by weather and ground conditions.

Table 2. Effects of prescribed fire on specific invasive non-native plants found within the Two Eagle Project Boundary. From USDA Fire Effects Information System Website

Scientific/Common name	Timing	Effect
<i>Cardaria draba</i> /Whitetop	Spring	No effect on plant frequency or control
	Fall	No effect on plant frequency or control
<i>Centaurea diffusa</i> /Diffuse Knapweed	Spring	Increased in seasons following fire
	Fall	Doubled two years after fire
<i>Hypericum perforatum</i> /Common St. Johnswort	Spring	Quickly increased after fire
	Fall	Increased albeit at a lower rate than spring burning
<i>Ventenata dubia</i> /Ventenata	Spring	Unknown
	Fall	Unknown
<i>Bromus tectorum</i> /Cheatgrass	Spring	Little effect due to the difficulty in burning early in the season.
	Fall	Trend of increased seed production in the seasons following the fire
<i>Cirsium arvense</i> /Canada Thistle	Spring	Potential discouragement of growth during late spring burning
	Fall	Frequency of fire can affect the growth of this and other thistles
<i>Potentilla recta</i> /Sulfur Cinquefoil	Spring	Plant density increased more slowly but was higher after 5 years
	Fall	Plant density was higher than spring burns 1 year after fire but lower after 5 years
<i>Cynoglossum officinale</i> /Hounds tongue	Spring	May be favored in a post-fire community
	Fall	May be favored in a post-fire community

Table 3 names the project elements pertinent to invasive plant establishment and spread, summarizes the effects of implementing the actions, and compares the amounts of acres or miles of the proposed alternatives.

Table 3. Element specific effects of action alternatives

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Alternative Elements	Potential Effects	Rationale		
Commercial Harvest Treatments	Ground disturbance and introduction of plant materials on people and vehicles	<p>-This activity generally includes hand/saw work and machinery. The possibility of larger scale disturbance associated with harvest can increase the risk of non-native plant introduction and spread. The increase in traffic along haul routes can also compound the risk of introduction or movement of unwanted plant material.</p> <p>-Regional ROD Standards 2 and 3 would reduce the risk associated with this element, but not enough to change the intensity from "Moderate" to "Low".</p>		
Effects Comparison		Alternative 2	Alternative 2M	Alternative 3
*Treatment Acres		1,507 acres	1,869 acres	1,166 acres
*Potential for Effect		Moderate		Moderate
Noncommercial Mechanical Treatments	Ground disturbance and introduction of plant materials on people and machinery. Reduced canopy.	<p>The use of heavy equipment for grapple piling increases the possibility for ground disturbance as well as introduction of new plant material. Decrease in canopy cover decreases competition and provides increased opportunities for invasive plant establishment.</p> <p>-Mitigations 1, 3, and 4 and Regional ROD standard 2 would further reduce the risk involved with this activity element.</p>		
Effects Comparison		Alternative 2	Alternative 2M	Alternative 3
*Treatment Acres		1,026 acres	707 acres	905 acres
*Potential for Effect		Moderate		Moderate
Post Treatment Activities Mechanical Grapple Pile/ Landing Pile Burning/ Underburning	Ground disturbance and introduction of plant materials on people and machinery. Grapple piles create large diameter burn scars for invasive plants to establish.	<p>The use of machinery to pile and excavators increases the possibility for ground disturbance as well as introduction of new plant material. Many of the acres will be entered multiple times to complete precommercial thinning, piling and burning, and underburning elevating the risk for introduction of invasives.</p> <p>- Mitigations 1, 3, and 4 and Regional ROD standard 2 would further reduce the risk involved with this activity element. Seeding the burn scars as quickly as possible after they are burned helps to limit the foothold of invasive species establishment.</p>		
Effects Comparison		Alternative 2	Alternative 2M	Alternative 3
*Treatment Acres		1,570 acres	1,477 acres	1,253 acres
*Potential for Effect		Moderate	Moderate	Moderate
Post Treatment Activities Handwork Whipfelling/ Handpiling/ Planting	Introduction of invasive plant materials on personnel. Burn scars from pile burning create bare ground for invasive plants to establish.	<p>Work done by hand would minimize ground disturbance. There is potential for personnel to spread seeds via clothing and boots. The size limitation and minimal ground disturbance associated with hand piles allows the burn scar to grow in from the edges more readily than grapple piles</p>		
Effects Comparison		Alternative 2	Alternative 2M	Alternative 3
*Treatment Acres		1,848 acres	1,804 acres	1,386 acres
*Potential for Effect		Low	Low	Low
Post Treatment Fuels Blocks – Prescribed	Increase in disturbance, available resources, and short-	<p>-Prescribed burning has the potential to increase disturbance thus favoring invasive non-native plants. The short-term reduction in fuels may also reduce competition of native plants allowing increased spread.</p>		

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Alternative Elements	Potential Effects	Rationale		
Burning/ Pile Burning	term reduction in competition.	-The degree of disturbance from burning could, depending on timing, reduce the cover of existing invasive plants and retard seed set. Burning occurring in the summer can be beneficial when conducted in conjunction with ongoing invasive species treatment, but burning in the spring and fall are generally not adept at controlling invasive plant sites. - Mitigations 1, 3, and 4 would reduce the effect intensity from "Moderate" to "Low"		
Effects Comparison		Alternative 2	Alternative 2M	Alternative 3
*Treatment Acres		6,519 acres	6,369 acres	5,340 acres
*Potential for Effect		Moderate	Moderate	Moderate
Yarding Systems (Ground Based)	Ground disturbance and introduction of plant material	-Mechanical aids to harvest increase the level of ground disturbance by producing skid trails and other bare ground areas. The possibility of creating conditions favoring invasive plant introduction is increased with this type of activity. Movement of plant material to new areas is also a risk. -Regional ROD standards 3, 12, and 13 would reduce these effects.		
Effects Comparison		Alternative 2	Alternative 2M	Alternative 3
*Treatment Acres		1,209 acres	1,209 acres	1,014 acres
*Potential for Effect		High	High	High
Yarding Systems (Skyline)	Minimal ground disturbance	-Skyline yarding would have much less ground disturbance associated with it.		
Effects Comparison		Alternative 2	Alternative 2M	Alternative 3
*Treatment Acres		291 acres	291 acres	198 acres
*Potential for Effect		Low	Low	Low
Roads (closed system roads and new roads opened temporarily)	Ground disturbance and introduction of plant materials on people, machinery, and vehicles	-Road use creates situations that favor the spread of invasive plants by disturbing roadsides and carrying seeds to non-infested areas. Re-opening of roads can allow for the spread of invasive non-native plants to previously non-infested areas. - Mitigations 1 and 3 and Regional ROD standards 2, 3, 7, and 8 would help moderate the risk associated with this activity element, but would not reduce the intensity of that risk.		
Effects Comparison		Alternative 2	Alternative 2M	Alternative 3
*Treatment		5.25 miles	5.25 miles	3.57 miles
*Potential for Effect			Moderate	Moderate

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Alternative Elements	Potential Effects	Rationale		
Roads (closed roads temporarily opened with spot maintenance performed including culvert replacement)	Ground disturbance and introduction of plant materials on people, machinery, and vehicles	-Road use creates situations that favor the spread of invasive plants by disturbing roadsides and carrying seeds to non-infested areas. Re-opening and making new roads can allow for the spread of invasive non-native plants to previously non-infested areas. -Mitigations 1 and 3 and Regional ROD standards 2, 3, 7, and 8 would help moderate the risk associated with this activity element, but would not reduce the intensity of that risk.		
Effects Comparison		Alternative 2	Alternative 2M	Alternative 3
*Treatment		15.85 miles/ 4 culverts	15.85 miles/ 4 culverts	5.01 miles/ 3 culverts
*Potential for Effect		Moderate	Moderate	Low/Moderate
Roads (Reconstruction including culvert placements)	Ground disturbance and introduction of plant materials on people, machinery, and vehicles	- Disturbance of road sides can allow for the spread of invasive non-native plants to previously non-infested areas. -Mitigations 1 and 3 and Regional ROD standards 2, 3, 7, and 8 would help moderate the risk associated with this activity element, but would not reduce the intensity of that risk.		
Effects Comparison		Alternative 2	Alternative 2M	Alternative 3
*Treatment		1.7 miles/ 3 culverts	1.7 miles/ 3 culverts	0.7 miles/ 3 culverts
*Potential for Effect		Moderate	Moderate	Low/Moderate
Cottonwood Restoration	Thinning of over story which could increase competitiveness of invasive species. Introduction of plant materials on people.			
Effects Comparison		Alternative 2	Alternative 2M	Alternative 3
*Treatment Acres		8 acres	8 acres	0 acres
*Potential for Effect		Low	Low	None

All of the action alternatives have some amount of proposed treatment for each element. Therefore, the comparison of the effects of the alternatives is essentially a comparison of the number of acres, or miles, proposed for each element. There is an increased risk of potential effects associated with increased acres treated, but the differences among the alternatives are not enough to change the score on the qualitative scale used in the assessment.

While effects of fuels reduction/vegetation management projects on non-native species are difficult to predict and quantify, and may change depending on the duration of the activity and extent of the disturbance, certain associated activities may affect different species in different manners. For example, the effects of prescribed fire and pre-commercial thinning can vary depending on the specific technique and the timing of the activity. Prescribed burning can affect the invasive non-native plants differently (See Table 2) depending on the time of occurrence. Fall burning has been shown to increase (although not significantly) the number of native species, while spring burning tends towards a decrease in the number of non-natives (Potts & Stephens, 2009).

Effects of commercial and non-commercial thinning treatments also depend on the timing as well as the type of activity. Heavy equipment use has the greatest potential for disturbing soil and introducing plant material to an area, while low impact mechanical thinning by way of mastication has the least potential. However, timing of mastication activities appears to affect the response of non-native plants as spring thinning by mastication showed a decreased in non-native introductions when compared to similar activities in the fall. Timing of activities within this project should consider these variable effects.

Road activities (including use and construction of temporary roads as well as culvert replacements) can create situations that favor the spread of invasive plants by disturbing roadsides and carrying seeds to un-infested areas. Use and construction of temporary roads can allow the easy spread of invasive non-native plants to previously un-infested areas. The risk associated with road activities and non-native species would increase as miles of temporary road use and construction increases. Exact estimates of this risk however, are unknown and difficult to predict.

Potential for Establishment

Direct effects to the establishment potential of invasive non-native species as a result of project activities would occur by the movement of invasive species materials on project personnel and equipment. As the number of acres of total treatment increases, the amount of personnel and equipment increases, thus the short-term risk of non-native species establishment also increases. As can be seen in Table 3, Alternative 3 proposes the least amount of treatments for all activities. Alternatives 2 and 2M propose about 500 more acres of commercial harvest combined with noncommercial treatments which makes the potential risk for non-native species establishment in these alternatives relatively greater. Alternatives 2 and 2M also increases potential risk of establishment by proposing more miles of road related activities.

Prescribed fire has a dynamic effect on establishment of invasive plants. The decreased fuel loadings and subsequent reduced potential risk for large-scale wildfire that would result could reduce the need for suppression activities in the long-term, indirectly reducing the opportunity for the transportation of non-native invasive species material and establishment of new invasive species and sites within the project area in the event of a wildfire. While 150 acres more fuel reduction activities would occur under Alternative 2 than Alternative 2M, potential large fire risk reduction would be similar for both of these alternatives.

The overall effect of all the actions in these alternatives on the potential to establish invasive non-native species is estimated to be in the range of **Moderate**, due to the number of acres of proposed mechanical activity with a short-term effect, being offset by the project mitigation measures and the fuels reduction work resulting in a subsequent decrease in wildfire risk in the long-term. The differences in the alternatives give varying degrees of potential effects but still remain in the moderate category.

Potential for Spread

Direct effects to the spread potential of invasive non-native species due to project activities may occur due to movement of invasive species materials on project personnel and equipment combined with ground disturbance as a result of project activities. As the number of acres of total treatment (more potential disturbance and more movement of project equipment) and the total acres of non-native invasive species (more propagule pressure) increases; the risk of non-native species spread also increases. As described above, Alternatives 2 and 2M propose the most acres of total treatment (prescribed fire, non-commercial thinning, commercial treatment, and post treatment). They also propose the most acres of ground based yarding and the most miles of road related activities (Table 3). All of these activities have a potential to increase the risk of spreading invasive species in the short-term beyond the current extent of known sites; however, implementation of the prevention mitigation measures such as pre-treatment of known

infestations, avoiding active infestation sites, and machinery cleaning requirements should limit the potential for spread.

Fuel load reduction contributes to indirect effects in terms of a contributing to a potential reduction in the risk of spread. This benefit is due, in part, to the decreased fuel loading and reduced risk of large-scale wildfire in the long-term that would result from this vegetation management project. With a lowered risk of wildfire potential, there would be a decrease in the amount of potential ground disturbance from the fire and a decrease in suppression activity. These decreases would reduce the potential “invasibility” of the area due to wildfire activity and decrease the opportunity for the transportation of non-native invasive species material on personnel and equipment used for suppression activity. Thus, the spread of existing invasive species beyond their current extent would also be reduced.

The overall effect of the actions in these alternatives on the potential to spread invasive non-native species is estimated to be **Moderate**, due to the increased area of proposed activity and ground disturbance with a short-term effect being offset by the potential decrease in risk of large-scale wildfire in the long-term. However, the effects under Alternatives 2 and 2M would still be greater than those found under the Alternative 3 due to the increase in activities proposed.

Cumulative Effects

Cumulative effects are the sum of all past and present actions, and reasonably foreseeable future actions in combination with the activities proposed in Two Eagle. Past activities are considered in the existing condition baseline for this project. Present and reasonably foreseeable future activities on Forest Service and private lands are described in Table 4 below. The purpose of this table is to determine which of the present and reasonably foreseeable future activities overlap in time and space with Two Eagle and if they do, if there is a measureable cumulative effect for non-native plants in the project area.

Table 4. Cumulative Effects for the Two Eagle Project on Non-native Invasive Species

Project	Potential Effects	Overlap in:		Measurable Cumulative Effect?	Effects
		Time	Space		
Noxious Weed Management W-W Invasive Species Treatment ROD	Reduction in the extent and spread of invasive plant populations	Yes	Yes	Yes	Reduces the extent and amount of invasive plant sites throughout the project area through on-going treatments of existing invasive populations.
Special Uses: >Phillips-Ingle Ditch	Ground disturbance or transportation of non-native plant material	Yes	Yes	Yes	Maintenance and repair of most Special use facilities can create situations that favor the establishment and spread of invasive plants by disturbing ground and carrying seeds to un-infested areas. Regional standards along with noxious weed requirements which are part of the special use permits would help to reduce the risk of this potential effect. Two Eagle activities overlap many of these sites and would increase the potential for spread of invasive species.

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Recreation – Eagle Creek Wild and Scenic River/ Recreation-Dispersed Camping	Movement and introduction of invasive plant material.	Yes	Yes	No	Minimal risks involved with dispersed camping due to the movement and spread of invasive plant material by people and equipment. This risk is further minimized by a focused treatment of invasive plants in and around camping and gathering areas.
Recreation- Snowmobile Trails	No potential effects due to timing of activity	Yes	Yes	No	Winter use is unlikely to create ground disturbance or to spread invasive plant material; therefore, there are no measurable cumulative effects.
Recreation -Firewood Cutting	Movement and introduction of invasive plant material	Yes	Yes	No	Minimal risks involved with firewood gathering due to the limited nature of the activity and the location near already established roads. This risk is further minimized by a focused treatment of invasive plants in commonly used gathering areas.
Recreation – OHV Use	Movement and introduction of invasive plant material	Yes	Yes	Yes	Unregulated use of off highway vehicles poses a risk to the establishment and spread of non-native species due to the movement of plant material on equipment and the ability to introduce these materials to random areas that are difficult to identify for treatment. Re-opening roads and opening up stands with fuel reduction treatments in Two Eagle increases the potential for introduction and spread of invasive plant material.
Recreation – Two Color Guard Station, Two Color Campground, Boulder Park Recreation Residences (7 cabins), and Boulder Park Campground	Movement and introduction of invasive plant material	Yes	Yes	No	Minimal risks involved with these recreation activities due to the movement and spread of invasive plant material by people and equipment. This risk is further minimized by a focused treatment of invasive plants in and around camping and gathering areas.
Roads & Trails – Travel Management Plan	Decrease in possibility of spread and new introduction	Yes	Yes	Yes	Designating roads, trails and areas has the potential improve the compliance with the Two Eagle post-sale road management plan because use will only be allowed on designated roads and trails. Limiting this use will minimize the potential introduction and spread of noxious weeds.

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Road Maintenance – 7700, 7755, & 6700 Roads	Increase in possibility of spread and new introduction	Yes	Yes	Yes	Ongoing road maintenance creates situations that favor the spread of invasive plants by disturbing roadsides and can increase the establishment by carrying seeds to un-infested areas.
Grazing Allotments	Ground disturbance or transportation of non-native plant material	Yes	Yes	Yes	Cattle are vectors for invasive plant seeds. Opening up the forest with fuel reduction practices along with creating seed beds through ground disturbance increases the potential for cattle to transport noxious weed seeds into new areas and increase spread.
Wildlife Enhancement – Bald Angel Closure Area	Reduction in road use during critical winter range period	Yes	Yes	No	This activity would have no effect on invasive plant establishment or spread.
Private Land Activities	Equipment and materials travelling on road systems shared by project.	Yes	Yes	Yes	Potential for weed seeds to be carried from private land which may not have an active invasive plant management program to locations that intersect with project activities.

Based on the analysis in Table 4 above, potential cumulative effects will only be discussed related to private land activities, grazing, roads and trails, OHV use, special uses, and noxious weed management because they were determined to overlap in time and space and potentially result in a measurable cumulative effect when considered in combination with the activities proposed in Two Eagle.

Alternative 1

There will be no direct/indirect effects to invasive non-native plants as a result of the no action alternative because project activities will not be authorized. All current conditions and trends will continue unchanged. Since there are no direct/indirect effects then there will be no cumulative effects.

Alternatives 2, 2M, and 3

There is a potential for weed seeds to be carried from private land which may not have an active invasive plant management program to locations within the project area.

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Cattle are vectors for invasive plant seeds. Opening up the forest with fuel reduction practices decreases forest canopy and creates seed beds through ground disturbance increasing the potential for cattle to access areas where vegetation previously blocked their access thus allowing the potential for them to transport noxious weed seeds into new areas and increase the spread of current infestations. More of this would happen in Alternatives 2 and 2M than in Alternative 3.

Ongoing road maintenance creates situations that favor the spread of invasive plants by disturbing roadsides and can increase the establishment by carrying seeds to un-infested areas. There is a slight potential for invasive spread and introduction from machinery involved in the road maintenance work by logging equipment crossing over or through areas where new invasive plant material has been introduced during road work. All action alternatives have a similar potential for this to occur.

Implementation of a travel management plan managing cross-country travel and motor vehicle use on roads, trails, and areas would reduce the potential to spread invasive plant material on vehicles and personnel and reduce the ground disturbance from user created roads and trails. Designating roads, trails and areas has the potential to improve compliance with the Two Eagle post-sale road management plan because motor vehicles would be restricted to designated roads and trails. Limiting cross-country travel and motor vehicle use on non-designated roads would minimize the potential introduction and spread of noxious weeds and increase the effectiveness of the Two Eagle post-sale road management plan.

Unregulated use of off highway vehicles poses a risk to the spread and establishment of non-native species due to the movement of plant material on equipment and the ability to introduce these materials to random areas that are difficult to identify for treatment. Re-opening roads and opening up stands with fuel reduction treatments in the Two Eagle project increases the potential for introduction and spread of invasive plant material into more areas. More of this would occur in Alternatives 2 and 2M than in Alternative 3.

Maintenance and repair of most special use facilities can create situations that favor the establishment and spread of invasive plants by disturbing ground and carrying seeds to un-infested areas. The irrigation ditch within the project area requires annual monitoring and bank cleaning with a backhoe. Regional standards along with noxious weed requirements which are part of the special use permits would help to reduce the risk of this potential effect. Two Eagle activities overlap some of these sites and would increase the potential for spread of invasive species populations.

As described under Alternative 1, noxious weed management would continue to occur under all alternatives in this project which would continue to reduce the extent and amount of invasive plant sites through active treatment and management throughout the project area. Monitoring and mitigation associated with Two Eagle in combination with on-going noxious weed management will increase the effectiveness of noxious weed management under all action alternatives.

Increased flexibility and treatment options as part of the WWNF Invasive Plant EIS (EIS) will increase the effectiveness of on-going treatment and mitigate many of the effects of project activities. Specific mitigations within this project and the EIS can also help reduce the rate and risk of introduction of non-native species. Specific to Two Eagle there are several mitigation measures. These are:

- Project personnel would inform invasive species personnel of upcoming project activities (i.e. temporary road openings, harvest, etc.), so reprioritization of treatment (if deemed necessary) and inventory can begin prior to the start of project activities.

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- New infestations would be inventoried and managed as rapidly as possible under early detection rapid response (EDRR) guidelines.
- To reduce the potential spread from known invasive plant sites, these occurrences would be identified as Areas-To-Avoid for moderate to high-risk ground disturbance activities. Coordination will occur with invasive species specialists for exceptions.
- All landing piles, created as part of a whole tree yarding system, would be rehabilitated and seeded with an approved native seed mix. Skid trails would also be reseeded following project activities.

These measures should reduce risks involved with project activities and reduce the cumulative impacts on the project area occurring through all management activities.

Generally, the risk of wildfire combined with unregulated travel, road use and grazing has the greatest potential to create cumulative effects on non-native plants within Two Eagle but predicting wildfire occurrence is problematic. Large scale and intense wildfire disturbance would create ideal areas for the introduction and spread of non-native plants. With increasing numbers of wildfires the numbers of non-native species could increase in the long-term (Merriam, et al., 2006), with the largest increases found in those areas with pre-existing non-native plant populations. One benefit of this project is the decrease of current fuel loading and therefore the risks of uncontrolled high-intensity wildfire, so future large-scale burns should be reduced. This reduction may further decrease the risk for areas outside of the treatment area boundaries (Merriam, et al., 2006).

Summary of Effects

The effects found in the above analysis can manifest in a variety of ways depending on the alternative. Each alternative has its own risks and effects that would be expected from project activities.

As stated earlier, Alternative 1 would have no new direct effects due to project activities within the project boundary. The risk of a stand replacing wildfire is increased due to increased fuel loading, and the potential for invasive species spread and establishment would increase beyond the rate found naturally. This effect, plus continuing risks from other types of activities occurring in the analysis area, would favor the spread potential of invasive species within the project area (Table 5) to levels beyond that found without wildfire activity.

Table 5. Summary of estimated effects for all alternatives in the Two Eagle Project

Est. Effect*	Alternative 1	Alternative 2	Alternative 2M	Alternative 3
Establishment Potential	1	3	3	2
Spread Potential	4	2	2	3

* Estimated effect is based on increases (from pre-project levels) in establishment and spread of invasive non-native species due to project level activities. Higher number equates to higher risk but is only used for comparison between alternatives and is not an estimate of the intensity of the effect.

Although risks are present with or without project activities, the danger of invasive species establishment due to project activities under the action alternatives is higher than the 'no action' alternative. The highest risk of establishment would be under Alternative 2M because it proposes the greatest amount of activities. Alternative 3 proposes the least amount of ground disturbing activities. However, the potential to spread invasive non-native species under either of the action alternatives is likely less than under the no action

alternative. This is due in large part to the reduction in wildfire risk associated with the action alternatives (slightly more risk under Alternative 3 due to a smaller reduction in overall fuel loading). With implementation of project design features to reduce and control the introduction and spread of non-native species we can minimize the existing impacts. Specific mitigations and required standards would continue to reduce the chances of new introductions, establishment, and spread of invasive non-native plants and we could predict an establishment and spread rate at the upper end of the natural level or about 6-8% for any of the action alternatives.

Compliance with the Forest Plan and Other Direction

The Forest Plan (as amended by the 2005 Region 6 ROD, amendment RF #5) provides direction for the control of noxious weeds and other competing vegetation where such activities are not precluded by management area direction. The goals focus on maintaining or enhancing ecosystem function to provide for long-term integrity and productivity of biological communities, treatment of priority infestations, and monitoring the effects of all activities to reduce the impacts of non-native plants. The site specific treatment requirements are further amended by the Wallowa-Whitman National Forest Invasive Plant Treatment Program EIS (USDA, 2010). The Two Eagle Project is consistent with these goals by implementing the standards requiring emphasis of prevention of invasive plant introduction, requiring the use of weed-free materials (straw, mulch, gravel, fill sand, etc.), requiring the cleaning of all equipment prior to entering National Forest System lands, managing road maintenance activities in areas with high concentrations of noxious weeds and coordinating activities with pre-treatment, and requiring the use of native plant materials for rehabilitation and restoration work. Two Eagle is consistent with these goals through adherence to the WWNF Invasive Plant EIS and the Forest Plan.

Wild and Scenic Rivers

The Eagle Creek drainage within the Two Eagle Project Area is designated as a Wild and Scenic River Corridor. Standards and guidelines specific to the area are stated in the Wallowa-Whitman National Forest Land and Resource Management Plan (LRMP) (as amended by the Eagle Creek Wild and Scenic River Corridor Plan) with treatment requirements found in the Wallowa-Whitman National Forest Invasive Plant Treatment Program EIS (USDA, 2010). Standards and guidelines pertaining to invasive species state that we must recognize, promote, and enhance the qualities that preserve the ecological corridor.

Two Eagle (for invasive species) is consistent with this plan because of the proposed mitigation measures, adherence to the WWNF Invasive Plant EIS, and the Forest Plan.

Monitoring

The following table suggests a monitoring plan aimed at designating particular people to be responsible for fulfilling recommended assessments and actions at key times of the project to mitigate invasive plant establishment and spread.

Table 6. Monitoring

Type	Activity Monitored	Frequency and Timing	Responsible Person
Implementation	Noxious weed inspections, equipment cleaning, weed infestation avoidance, weed inventory, documentation and communication.	Daily during active operations near noxious weed infestations.	Sale Administrator
Effectiveness	Noxious weed survey and inventory	Annually for 3 years following project end.	Zone Invasive Plant Coordinator
Implementation	Noxious weed treatment/EDRR of disturbed ground	Annually for 3 years following project end.	Zone Invasive Plant Crew
Implementation	Broadcast seeding of disturbed soil along roads,	Immediately following soil disturbance	Sale Administrator and Road Maintenance

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Type	Activity Monitored	Frequency and Timing	Responsible Person
	skid trails and landings.		Foreman or COR
Implementation	Broadcast seeding of burned landing piles and grapple piles.	Earliest appropriate seeding opportunity after the piles are burned up.	Zone Invasive Plant Crew
Implementation	Road rock sources, pits and/or quarry noxious weed inspections	Prior to use for road construction, reconstruction, or maintenance	Zone Invasive Plant Coordinator; Zone Engineer
Implementation	Noxious weed avoidance while prescribed burning	Prior to lighting burn	FMO

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